DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
Interim Final 2/5/99
RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: **CCL (Harrisonburg) Inc.**
Facility Address: **810 North Main Street, Harrisonburg, Virginia**
Facility EPA ID #: **VAD000485078**

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

   ☒ If yes - check here and continue with #2 below.

   ☐ If no - re-evaluate existing data, or

   ☐ If data are not available, skip to #8 and enter "IN" (more information needed) status code.

BACKGROUND

The CCL (Harrisonburg), Inc. facility occupies approximately 1 acre on a trapezoidal-shaped parcel positioned adjacent to the southeastern corner of East Washington Street and North Main Street in Harrisonburg, Virginia (site). A site location map is attached as Figure 1. Manufacturing at the facility began in 1959. A 4,000-gallon aboveground storage tank (AST) was used at the facility to store trichloroethene (TCE) from 1980 through 1986, at which time it was closed and removed. A release was discovered in 1990 when an environmental site assessment indicated the presence of TCE in soil samples in the vicinity of the closed AST.

Investigative and remedial activities are being performed under the regulatory oversight of the U.S. Environmental Protection Agency (USEPA) and Virginia Department of Environmental Quality (VADEQ) in accordance with the requirements of Administrative Order on Consent (Docket No.: RCRA-03-2011-0103-TH), entered into agreement on March 26, 2012.

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, (GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

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2. Is **groundwater** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

   ☒ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

   ☐ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

   ☐ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

A Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was completed for the site. Analytical data collected during the RFI defined volatile organic compounds (VOCs) as the main chemicals of concern (COCs).

The following table shows constituents detected in groundwater above the National Primary Drinking Water Maximum Contaminant Levels (MCLs) published by EPA or the EPA Regional Screening Levels (RSLs) for Tapwater (where no MCL is available).

Table 1. Contaminants of Concern in Groundwater	
Contaminant of Concern (COC)	**Wells with Historical Observed Exceedance**
Trichloroethene	MW-1, MW-2, MW-3, MW-4, MW-7A, MW-8
1,1-Dichloroethene	MW-7A
cis-1,2-Dichloroethene	MW-1, MW-2, MW-4, MW-7A, MW-8
Vinyl chloride	MW-1, MW-7A

Supporting Documentation:

Revised RCRA Facility Investigation Report, (Shield Environmental Associates, Inc., April 28, 2023)

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

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3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

   ☒ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2]).

   ☐ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) – skip to #8 and enter "NO" status code, after providing an explanation.

   ☐ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Groundwater elevation data collected during the RFI indicate a groundwater flow direction of west-southwest. Groundwater flow at the site is primarily through bedrock fractures. Dye trace data indicate that groundwater from the site flows to a surface discharge at the Big Spring located approximately 0.8 miles southwest of the site.

The source of the groundwater contamination is a TCE aboveground storage tank that was located in the northeastern portion of the site. The source area monitoring well (MW-1) historically has had the highest concentrations of TCE above MCLs. Elevated concentrations of TCE and its breakdown products 1,1-Dichloroethene (1,1-DCE), cis-1,2-Dichloroethene (cis-1,2-DCE), and Vinyl chloride have been detected in on-site down-gradient monitoring wells MW-2, MW-3, MW-4, MW-7A, and MW-8. Subsurface geophysical data have indicated that groundwater flow in monitoring wells MW-7A and MW-8 is confined to narrow, sub-vertical bedrock fractures.

COC detections have not been detected in off-site down-gradient monitoring well MW-6. Surface water sampling results from the down-gradient discharge location of Big Spring have indicated concentrations of TCE and cis-1,2-DCE consistently below MCLs. Based on these results, contaminated groundwater flows from the source area toward Big Spring, with other hydraulically isolated areas of elevated concentrations of COCs. Groundwater potentiometric and TCE isoconcentration maps from the October 2018 groundwater monitoring event are included as Figure 2 and Figure 3.

Concentrations of COCs have decreased significantly since monitoring at the site began. TCE concentrations in the source area monitoring well MW-1 have decreased from a high of 12.8 milligrams per liter (mg/L) in 2009 to 0.0821 mg/L in October 2018. TCE concentrations in down-gradient monitoring well MW-4 have decreased from a high of 2.6 milligrams per liter (mg/L) in 2012 to 0.0014 mg/L in October 2018. These reductions in TCE concentrations, along with the detections of TCE break-down products 1,1-DCE, cis-1,2-DCE, and vinyl chloride, suggest that dechlorination of TCE is occurring at the site through natural attenuation processes.

Supporting Documentation:

Revised RCRA Facility Investigation Report, (Shield Environmental Associates, Inc., April 28, 2023)

[2] "*existing area of contaminated groundwater*" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

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4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

☐ If yes - continue after identifying potentially affected surface water bodies.

☒ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

☐ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

The site is underlain by limestone bedrock exhibiting karst features. Karst is characterized by sinkholes, caves, and underground drainage systems that can result preferential flow pathways and groundwater discharge into springs or other surface water features. Spring location maps are included as Figure 4 (Big Spring and other nearby springs) and Figure 5 (Harrisonburg area springs).

Spring/surface water discharge was evaluated in June 2016 as part of the second phase of the RFI. A dye trace study was completed to evaluate the hydraulic connection between site monitoring wells. As part of the study, charcoal dye receptors were placed in the Big Spring, which showed a strong detection of dye. A second dye trace study was completed in October 2018 as part of the third phase of the RFI. Dye receptors were placed in Big Spring, Blacks Run, and Harrison House Spring, and a water sample was collected from Big Spring for analysis of site COCs. Dye was not detected in any of the spring receptors. Analytical results from the Big Spring sample indicated concentrations of cis-1,2-DCE and TCE below MCLs, consistent with historical results.

Phase four of the RFI consisted of surface water sampling to analyze water samples from several surface water springs in the area of the site. The following spring sampling locations were identified for further evaluation:

- Linville Spring, located approximately 4.5 miles north of the site
- Lacey Spring, located approximately 7.5 miles northeast of the site
- Silver Lake, Spring, located approximately 5 miles southeast of the site
- Smith Creek, located approximately 5 miles east-northeast of the site
- Linville Creek, located approximately 3.7 miles north of the site
- Blacks Run, located approximately 4.4 miles south-southwest of the site
- Cooks Creek, located approximately 7 miles southwest of the site

Samples were collected from the above springs, except for Lacey Spring; attempts were made to contact the property owner for sampling but were unsuccessful. All spring samples were analyzed for facility COCs using USEPA SW-846 Method 8260C, and all results were below laboratory detection limits.

The data collected to date do not indicate that contaminated groundwater is discharging into springs or surface water bodies within an approximate seven mile radius of the site.

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5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

☐ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting:
1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and
2) provide a statement of professional judgment/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

☐ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting:
1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and
2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination),and identify if there is evidence that the amount of discharging contaminants is increasing.

☐ If unknown - enter "IN" status code in #8.

[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

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6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

☐ If yes - continue after either:
1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater;
OR
2) providing or referencing an interim-assessment[5], appropriate to the potential for impact that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

☐ If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

☐ If unknown - skip to 8 and enter "IN" status code.

[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[5] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-system.

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7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

☒ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations, which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

☐ If no - enter "NO" status code in #8.

☐ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

Following approval of the RFI, a Corrective Action Plan will be developed, including an evaluation of monitored natural attenuation as a remedial approach. The specific well locations to be tested to verify that groundwater contamination is not migrating horizontally or vertically beyond the "existing area of groundwater contamination" will be detailed in the upcoming Corrective Action Plan.

Supporting Documentation:

Revised RCRA Facility Investigation Report, (Shield Environmental Associates, Inc., April 28, 2023)

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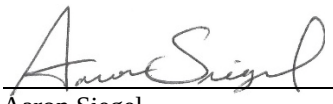
8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

☒ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the CCL (Harrisonburg) Inc., EPA ID # VAD000485078, located at 810 North Main Street, Harrisonburg, Virginia. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

☐ NO - Unacceptable migration of contaminated groundwater is observed or expected.

☐ IN - More information is needed to make a determination.

Completed by  Date 9/18/2023
Aaron Siegel
Remediation Project Manager

Supervisor  Date 9/18/2023
Tara Mason
RCRA CA and Groundwater Program Manager
Virginia Department of Environmental Quality

Locations where References may be found:

Virginia Department of Environmental Quality
1111 E. Main Street, Suite 1400
Richmond, Virginia 23219

Contact telephone and e-mail numbers
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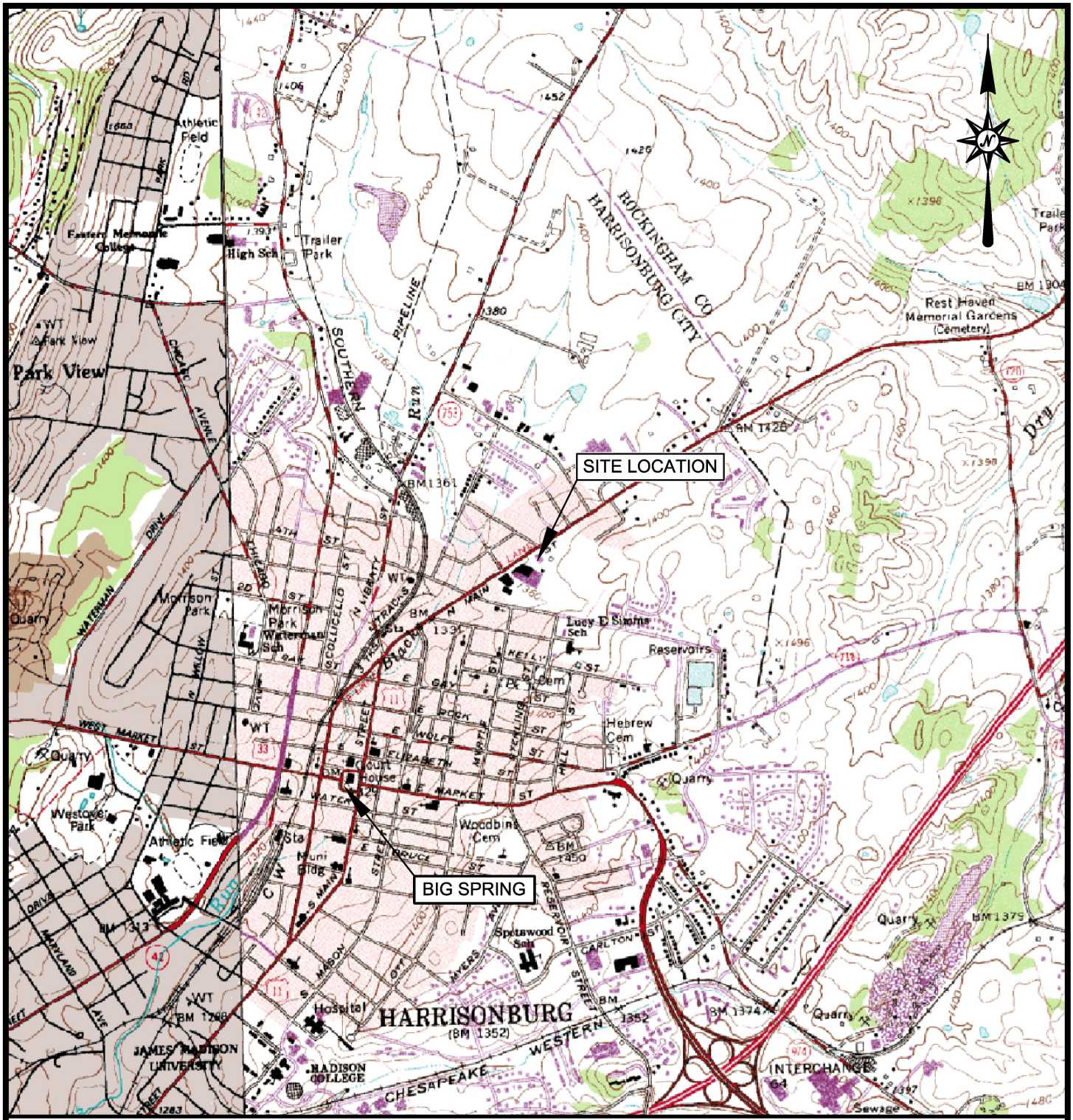


SOURCE: USGS 7.5' TOPOGRAPHIC QUADRANGLE MAP

0' 1000' 2000' 3000'

LATITUDE: 38° 27' 28"
LONGITUDE: -78° 51' 34"

SEPTEMBER 2014

PROJECT NO: 309-1210
DRAWN BY: SW
APPROVED BY: MM

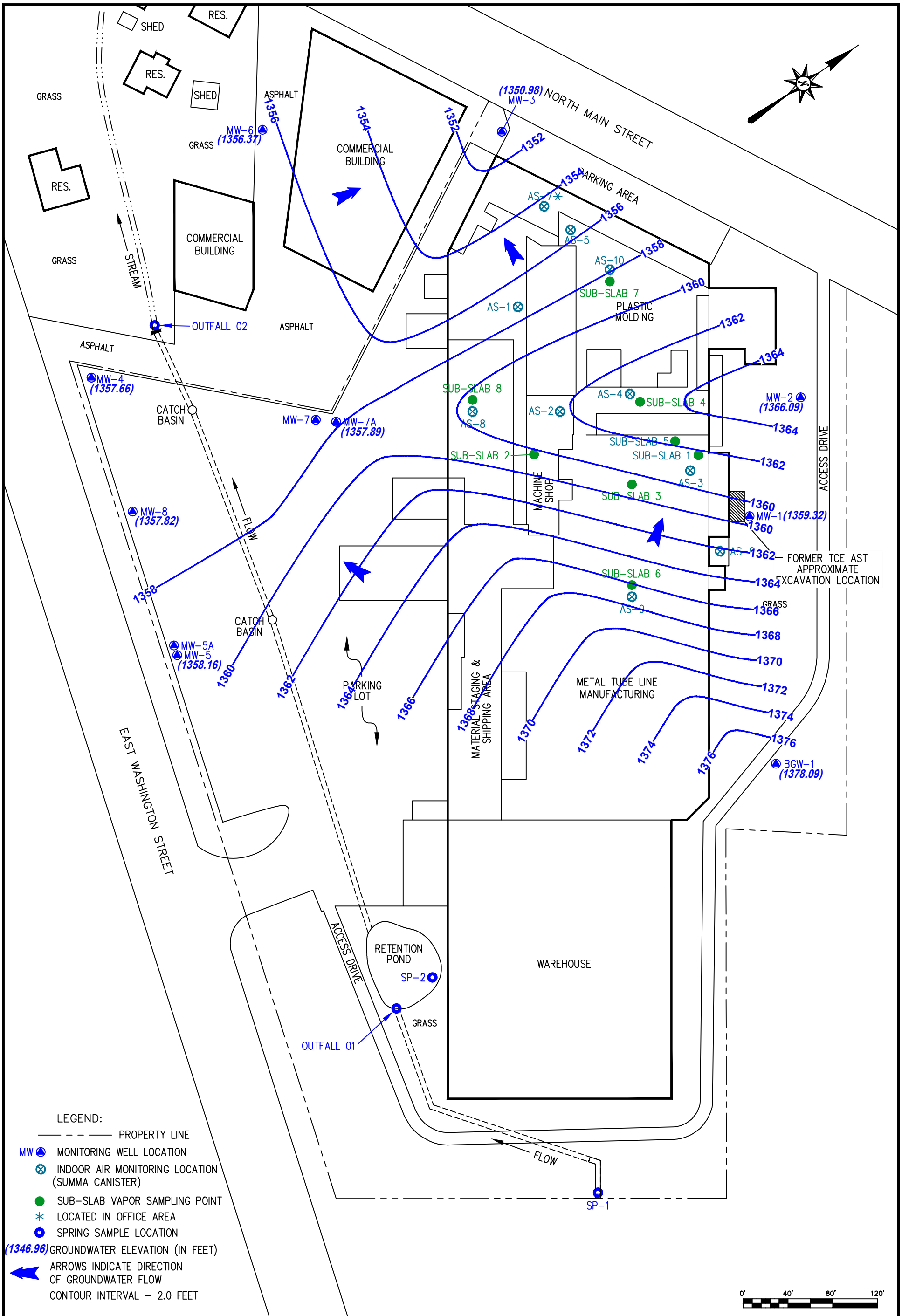
FIGURE 1

USGS TOPOGRAPHIC QUADRANGLE MAP

810 NORTH MAIN STREET
HARRISONBURG, VIRGINIA

SHIELD
ENVIRONMENTAL ASSOCIATES, INC.

948 Floyd Drive
Lexington, KY 40505
(859) 294-5155



NOVEMBER 2019

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APPROVED BY: MM

FIGURE 18

POTENTIOMETRIC SURFACE MAP (OCTOBER 22, 2018)

810 NORTH MAIN STREET
HARRISONBURG, VIRGINIA

SHIELD ENVIRONMENTAL ASSOCIATES, INC.
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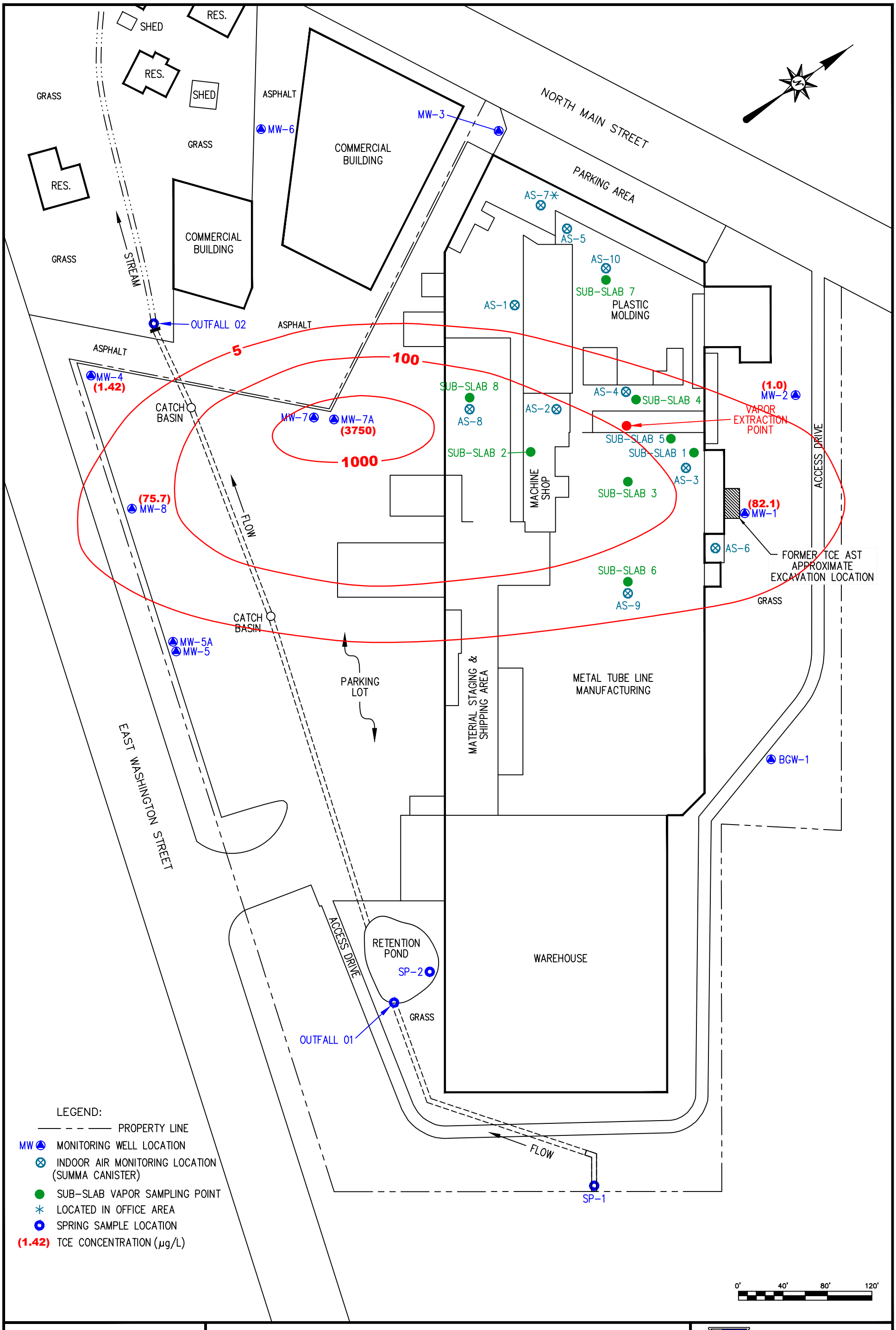

MARCH 2021

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APPROVED BY: MM

FIGURE 19

TCE CONCENTRATIONS IN GROUNDWATER (OCTOBER 22-23, 2018)

810 NORTH MAIN STREET
HARRISONBURG, VIRGINIA

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NOVEMBER 2018

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FIGURE 20

DYE RECEPTORS LOCATION MAP

810 NORTH MAIN STREET
HARRISONBURG, VIRGINIA

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APPROVED BY: MM

FIGURE 26

SITE MAP WITH SAMPLE LOCATIONS

810 NORTH MAIN STREET
HARRISONBURG, VIRGINIA

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